

## Emerging Resistance to Clinically Important Antimicrobial Agents Among Human *Salmonella* Isolates in the United States, 1996-1999

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**Background:** Increasing antimicrobial resistance in *Salmonella* is a worldwide problem and has been associated with use of antimicrobial agents in livestock. Although antimicrobial agents are not essential for most *Salmonella* infections, they may be lifesaving for the several thousand persons who have *Salmonella* bacteremia each year in the United States. Commonly used agents include fluoroquinolones (e.g., ciprofloxacin) for adults and third-generation cephalosporins (e.g., ceftriaxone) for children.

**Methods:** After serotyping, public health laboratories in the 17 state or local health departments participating in the National Antimicrobial Resistance Monitoring System (NARMS) for Enteric Bacteria forward every tenth nontyphoidal *Salmonella* isolate to CDC. Antimicrobial susceptibility is determined for 17 antimicrobial agents using Sensititre, a semi-automated system. Results: In 1996, 1326 isolates were tested, 1301 in 1997, 1466 in 1998 and 1477 in 1999. The percentage of *Salmonella* isolates resistant to >8 agents increased from 0.3% (4 isolates) in 1996 to 2% (29 isolates) in 1999. Resistance to ceftriaxone (MIC >64) increased from 0.1% (1 isolate) in 1996 to 0.7% (10 isolates) in 1998, and to 0.3% (5 isolates) in 1999; none of the isolates tested in 1996 had intermediate resistance to ceftriaxone (MIC 16 or 32), but 1.5% (22 isolates) had intermediate resistance in 1999. Decreased susceptibility to fluoroquinolones is also emerging; 0.4% (5 isolates) had decreased susceptibility to ciprofloxacin (MICs >0.25) in 1996 compared with 1% (15 isolates) in 1999.

**Conclusion:** Antimicrobial resistance is emerging among *Salmonella* to several clinically important antimicrobial agents, particularly third-generation cephalosporins. Additionally, an increasing proportion of isolates have intermediate resistance to cephalosporins and decreased susceptibility to fluoroquinolones. Mitigation efforts are necessary to preserve the efficacy of these essential antimicrobial agents.

### Suggested citation:

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